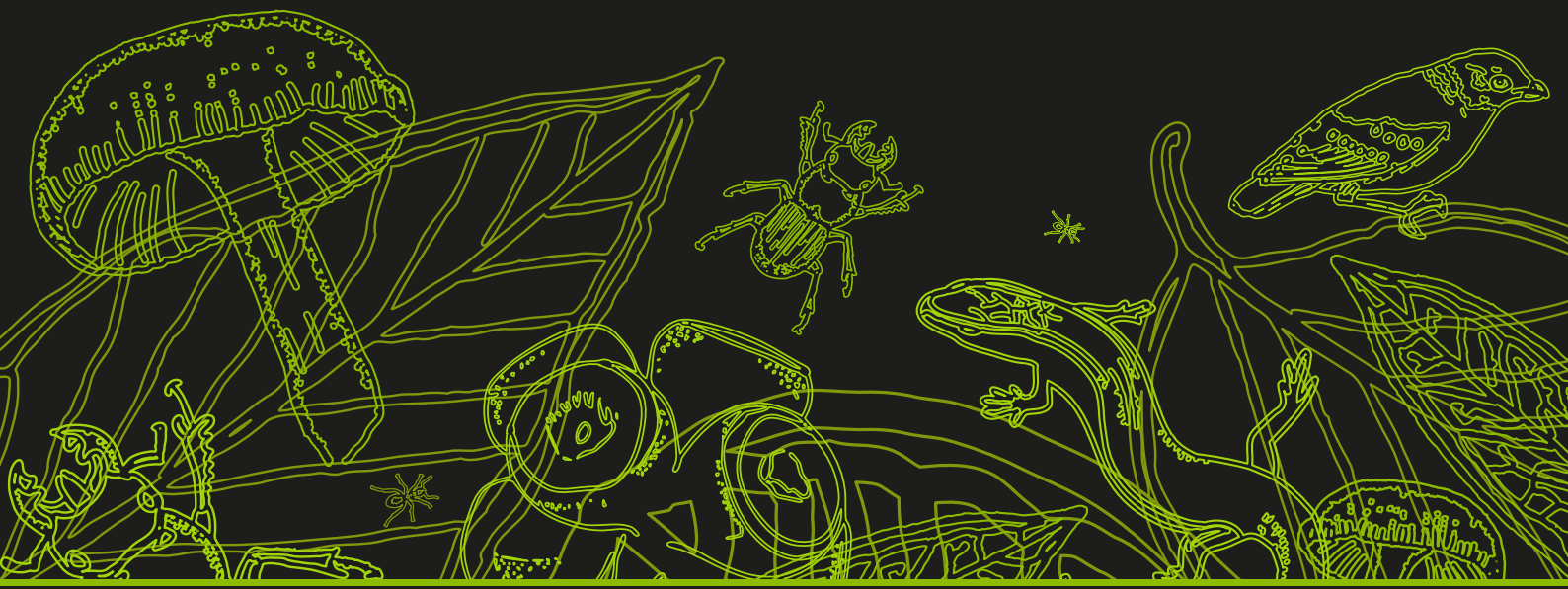
Forest Education Foundation
National Forest Learning Centre
The stories behind our trees

What Is A Forest?



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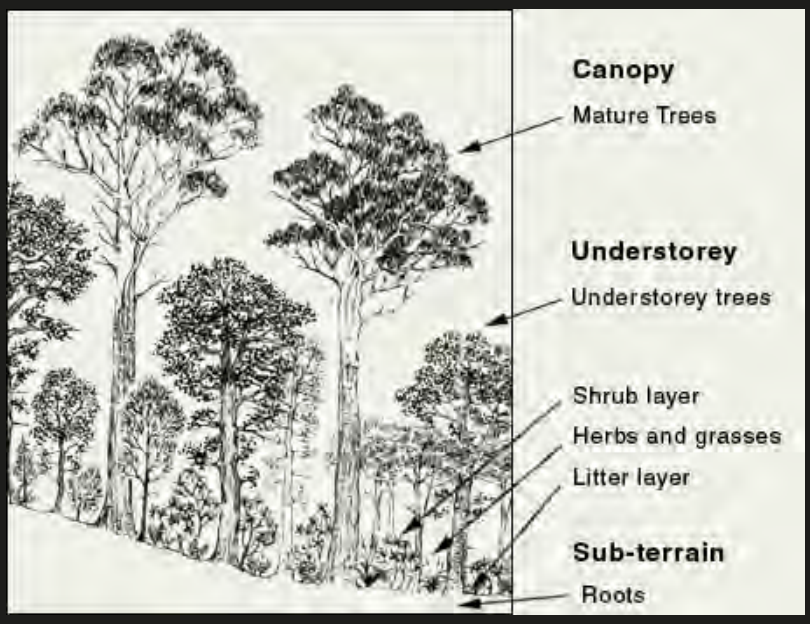

Although trees may be the main thing you see on a visit to a forest, in fact they are just the most eye-catching members of a whole community of life forms which interact, depending on one another to make use of available nutrients and water. Interaction and interdependence of plants and animals are common features of forests throughout the world. For example, without invertebrates, bacteria and fungi to release minerals from the soil, break down forest litter and help water to circulate, trees would be unable to get the nutrients they need in order to grow and provide shelter and food for insects and other invertebrates, and for birds and animals. Trees in turn depend on these creatures for pollination of flowers and for seed dispersal, as well as for nutrients returned to the soil in droppings, and in the bodies of plants and animals when they die.

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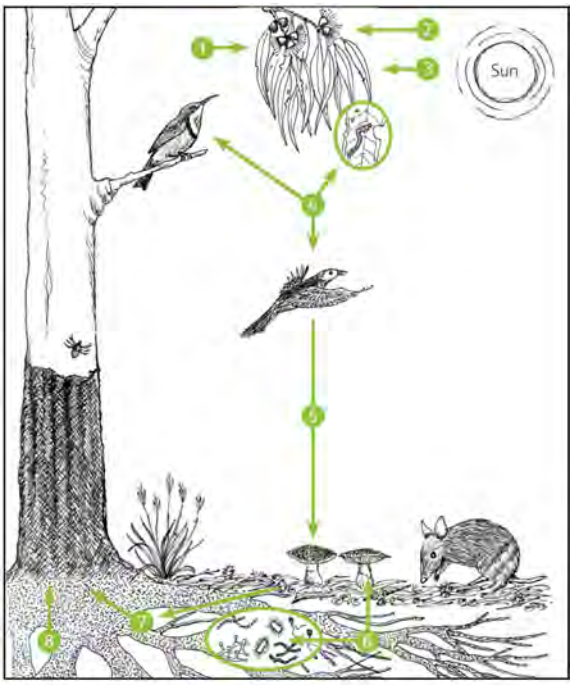
There are many types of forest communities, and the unique features of forests as they occur in the landscape relate to factors such as temperature, rainfall, soil type, altitude, frequency and intensity of fires, and interaction with surrounding animal and human populations and communities. Variations in these things can affect not only the size of plants, but also the species, distribution and numbers of plants and animals in a community.

Tasmania's geology, climate, landforms and frequency and intensity of fires vary widely. These variations are reflected in patterns of plant growth, which, besides forest, include dry and wet woodlands, alpine vegetation, native grasslands, buttongrass moorlands, wetlands and coastal communities such as heathlands. The term forest is usually only applied where trees exceed two metres in height and the canopy shades more than 20 per cent of the ground surface. Botanists have developed systems for describing differing forest structures within that broad grouping, taking into account things like height of tallest trees, area of canopy or overstorey, type of understorey, dominant species, and regeneration patterns. Tasmania has three main native forest types: cool temperate rainforest, wet eucalypt forest and dry sclerophyll forest. These forests grade into each other in environmental transition zones.

Producers, consumers and decomposers

Ecosystem is a word used to describe the network of connections that exists between life forms and their particular environment. Using the sun's energy, and water and chemical building blocks present in local soil, plants produce food for their own nourishment and growth by photosynthesis.

In almost every ecosystem, photosynthesis is the process that provides the basic stock of food that is passed on to be consumed by other organisms. For this reason, green plants are called producers, and the animals that eat either plants or other animals are called consumers. Another group of organisms, the decomposers, lives on dead plant and animal matter, breaking it down so that it can be returned to the soil and be taken up again by plants.



Did you know ?

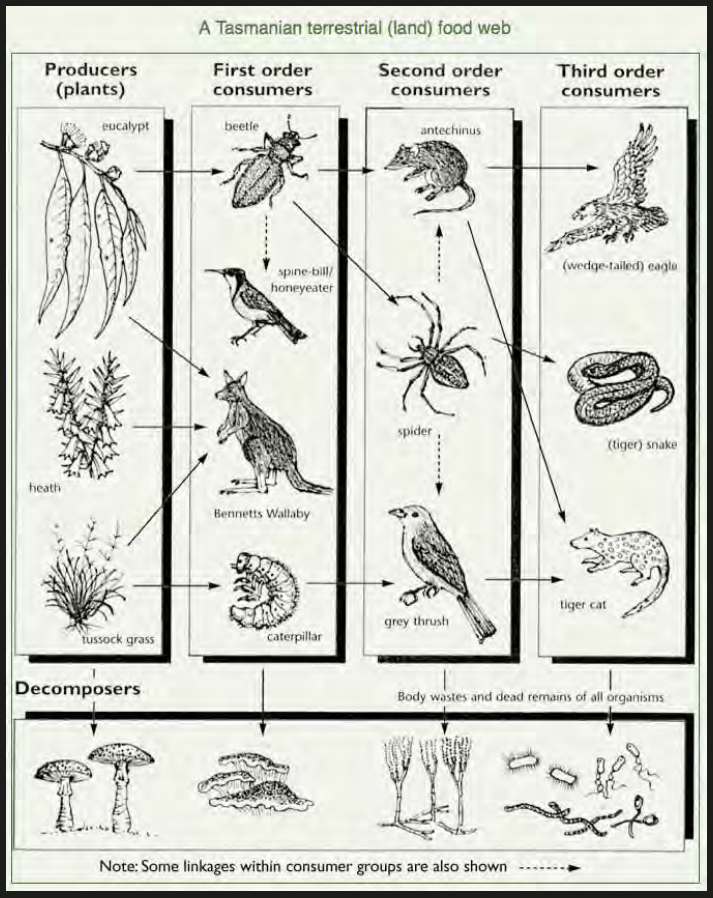
Fungi are a very diverse group of organisms that occur on a huge array of substrates (growing surfaces) and in almost all habitats.

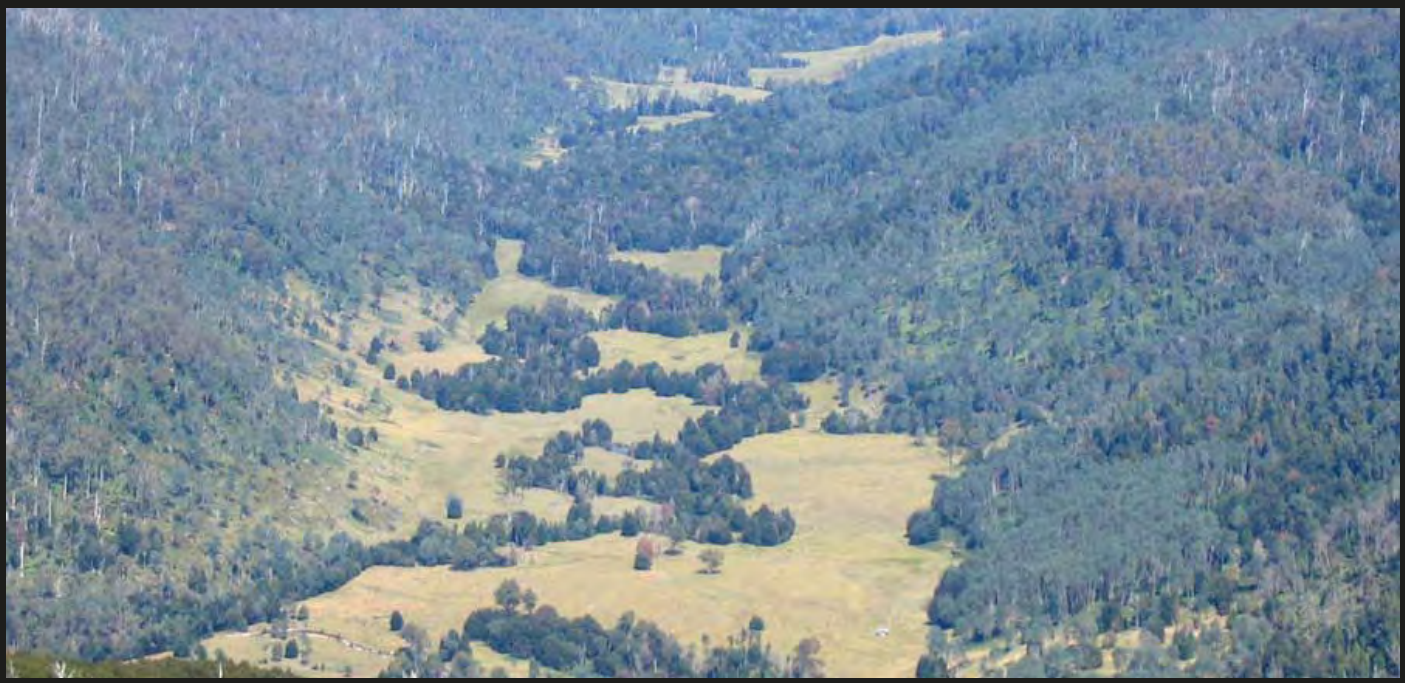
Fungi are classed as neither animals nor plants, instead belonging to their own kingdom. Fungi have no chlorophyll, and so produce complex enzymes to digest food. These enzymes are secreted outside the cells and then food is transported back into the fungus. Fungi are not dependent on light and therefore can grow in dark places, in any direction and into the interior of substrates to absorb nutrients.

Food webs

Within each ecosystem, materials move in a continuous nutrient cycle through a food web, from plants, to plant eaters (herbivores), to meat eaters (carnivores), to decomposers and back to plants. A single plant or animal may have links to many others; for example, in the case of those animals that eat plants as well as other animals (omnivores).

Cycles and food webs in forests, such as Tasmania's three main forest types, vary according to populations of plant eaters, meat eaters and decomposers that live there. Decomposers such as bacteria, fungi and some invertebrates are especially important members of food webs in forest habitats. Their role is to break down the tough, woody fibres of vascular plants, enabling the nutrient cycle to begin all over again.





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Forest Definition

Tick three boxes – yes, it's a forest!

	No	Yes
Do trees dominate the area?	☐	☑
Are most of the trees taller than two metres in height?	☐	☑
Do they shade more than 20% of the ground surface?	☐	☑

This broad definition covers all the world's different types of forest:

- The giant redwood forests of the Pacific North West of the USA
- The low-growing subalpine eucalypt forests of Central Tasmania
- The steamy tropical forests of the Amazon basin
- The evergreen forests that stretch across vast swathes of the Russian taiga
- The deciduous broadleaf forests of northern Japan

And dozens of others!

Geographical dictionaries have a definition for the word 'forest' – but it doesn't scratch the surface of the complex network of living things whose lives intertwine there.

But if all you see are the trees, you're missing most of the life of a forest.

That's because a forest is a complex ecosystem – a living web of many species of plants and animals.

From the forest canopy to deep in the soil, forests also provide shelter, food and habitat for thousands of species of animals – birds and mammals, reptiles and amphibians, insects and other invertebrates.

Most forests have several layers of plants:

- At the top is the canopy of mature trees
- Below are the understorey trees, then a layer of shrubs
- Close to the ground level are herbs and grasses
- Lying on the forest floor is a layer of litter – fallen leaves, branches and rotting logs
- In the earth below, probing roots seek water and nutrients

And that's just the plant life!

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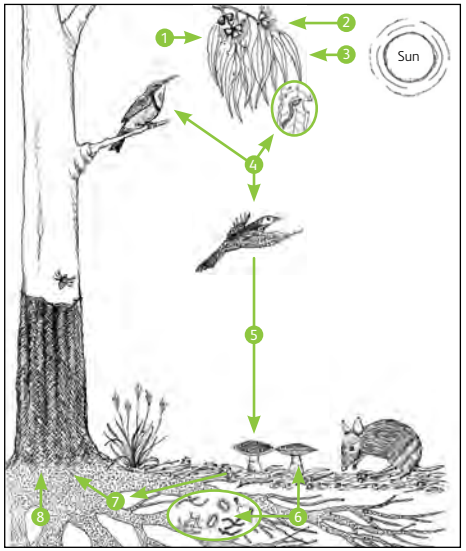
Biodiversity



1 Producer
2 Carbon dioxide used by growing plants
3 Light Energy
4 Consumers
5 Body wastes and dead remains of producers and consumers
6 Decomposers
7 Water
8 Nutrients

A forest is a complex web of life – a solar-powered community of plants and animals that depend on each other for their growth and survival. Biodiversity – a wide variety of plant and animal species – is a key element in a healthy ecosystem.

In a forest ecosystem, life starts with the sun – its ultra-violet light enables green plants to create their own nutrients through photosynthesis, using simple chemicals present in soil, water and air.

These plants are the producers – as they grow, they provide food for some of the forest's consumers, plant-eating animals and insects, which browse on leaves and seeds. Other animals in the forest prey on the consumers themselves – birds eat insects, carnivorous mammals scavenge carrion.

But all the producers and consumers put together are greatly outnumbered by the most numerous but least obvious creatures in the forest – the decomposers. These are the fungi, invertebrates and soil bacteria – they break down the plant and animal material that falls on the forest floor, recycling its nutrients to nourish new growth – and to ensure the cycle of life in the forest ecosystem continues.

Fascinating Forest Facts

Dry eucalypt forests support a wider variety of plant and animal species than any of the other Tasmanian forest types.

An ecosystem can be as big as an entire cool temperate rainforest – or as small as a pool of water in alpine heathland. Both may support a community of interdependent plants and animals.

Tasmania has only 35 species of native mammals – but an estimated 32,000 species of invertebrates. Only about a third of the invertebrates have been described scientifically.

More than half of Tasmania's vascular plants have been recorded from dry eucalypt forests.

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Forest Types

In the absence of fire, wet eucalypt forests cannot regenerate.

95 % of Australia's cool temperate rainforest occurs in Tasmania.

Dry eucalypt forests provide habitat for a much wider range of native animals and birds than other types of Tasmanian forests.

Dry Eucalypt Forest

These forests are mostly found in eastern and parts of central Tasmania.

They provide habitat for a much wider range of native animals and birds than other types of forests.

They are open forests with a wide range of plant species – trees in many dry eucalypt forests have adapted to low-nutrient soils and lack of water.

These forests rarely regenerate without some kind of disturbance. It may be a low-intensity fire that kills some of the trees; damage to trees by storms; or old trees dying – all these things create space in the forests and allow seedlings to grow.

Cool Temperate Rainforest

95 % of Australia's cool temperate rainforest occurs in Tasmania.

Most Tasmanian rainforest is in the western half of the island, in places where the annual rainfall is over 1200 mm.

The biggest area of rainforest is in the Tarkine region, between the Arthur and Pieman Rivers in the north-west.

Rainforests do not need fire to regenerate – seedlings of rainforest trees can establish beneath a shady canopy. Then, when a mature tree falls and a gap appears, they grow upward towards the light.

Wet Eucalypt Forest

Tasmania's widespread wet eucalypt forests thrive in areas of fertile soils and good rainfall.

These forests need fire to regenerate – they are dense, so wildfires are fierce, killing some trees and clearing the understorey, creating a good seedbed for regrowth.

In the absence of fire, wet eucalypt forests cannot regenerate.

Fascinating Forest Facts

One of the world's oldest living organisms is in a Tasmanian forest.

It's a stand of genetically-identical Huon pines on the West Coast. They have been reproducing vegetatively (when separate shoots live and die, but share the same root system) for about 10,000 years.

Of Tasmania's 29 species of eucalypt, 25 are found in the island's dry eucalypt forests. But our wet eucalypt forests are dominated by just three eucalypt species – stringybark, gum-topped stringybark and swamp gum.

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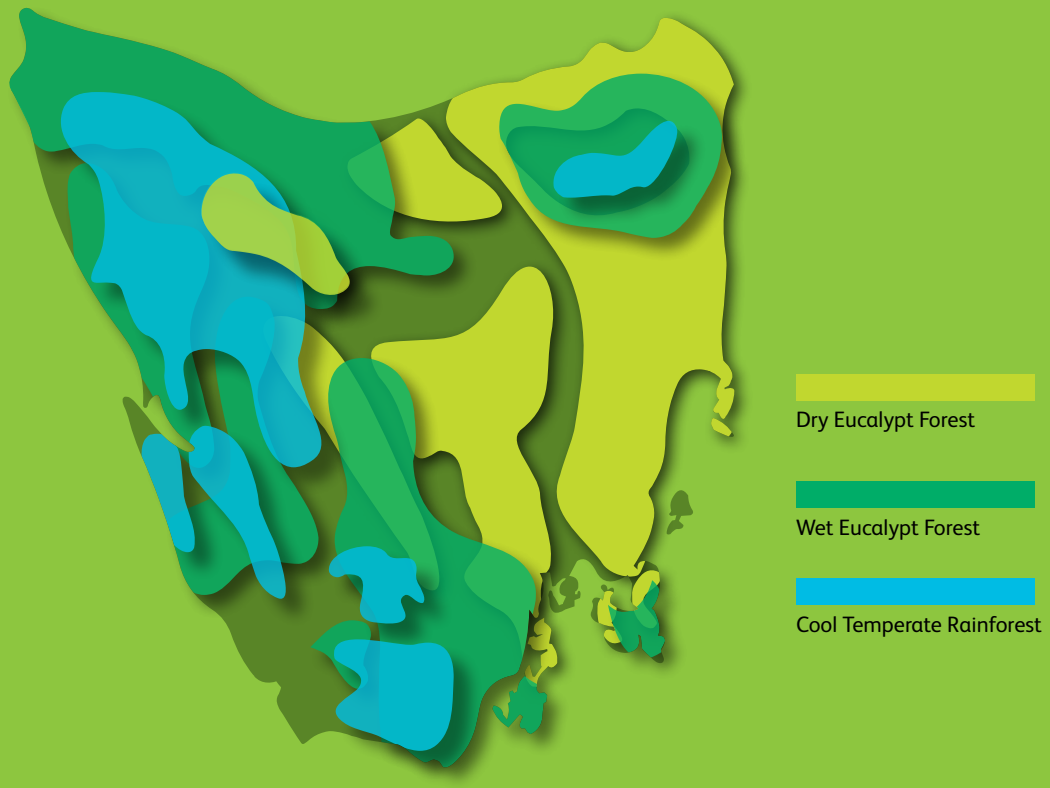
Forest Types

Different forests grow in different places – Tasmania's forests vary according to changes in soil, rainfall, climate, landforms and fire frequency.



Fascinating Forest Facts

Only one native Tasmanian mammal – the long-tailed mouse – makes its home mainly in cool temperate rainforest. Compared to other forest types, rainforests are quiet places, with few birds. But they provide habitat for a wide range of invertebrates – insects, spiders, snails and worms – in the leaf litter, in the soil and in rotting logs.

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Ideas for student questions

If you were describing a forest to a group of people, what would be the 3 most important things you would talk about?

How can the features of a landscape influence the type of forest that grows at a particular location?

What role do fungi play in the forest ecosystem and why is that important?

What might happen within an ecosystem if a disturbance affects the number of first order consumers?

What adaptations might understorey plants have to growing in low light conditions?

Ideas for classroom activities

Collect some samples of forest plants/leaf litter/flowers/mosses etc and build a 2D cross section to show the forest structure. You can also add pictures of animals in the correct habitats.

Investigate the three main forest types in Tasmania – dry sclerophyll, wet sclerophyll and cool temperate rainforest. Groups could find images, produce cross sectional drawings to show structure, draw distribution maps, make tables to compare various characteristics (sunlight, canopy cover, rainfall, biodiversity etc).

Explore the global distribution of dry/wet/rainforest biomes with reference to climates, soil types and productivity.

Explore the role of forests in the water or carbon cycle.

Links to Australian Curriculum - Science

Forest Education opportunities through science - years 1/2 - 9/10

Links to further information

What is a forest? - further information

Links to further supporting websites

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